Notice No.1

Rules and Regulations for the Classification of Special Service Craft

July 2017

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: July 2017

Amendments to	Effective date	Mandatory Instrument
Part 1, Chapter 2, Sections 2 & 3	1 August 2017	N/A
Part 3, Chapter 2, Sections 4, 5, 6 & 8	1 August 2017	N/A
Part 3, Chapter 4, Section 1	1 August 2017	N/A
Part 3, Chapter 5, Sections 3, 5 & 6	1 August 2017	N/A
Part 5, Chapter 1, Sections 1 & 2	1 August 2017	N/A
Part 5, Chapter 2, Sections 4 & 7	1 August 2017	N/A
Part 5, Chapter 3, Sections 2 & 3	1 August 2017	N/A
Part 5, Chapter 4, Section 2 & 3	1 August 2017	N/A
Part 5, Chapter 5, Sections 2, 3 & 4	1 August 2017	N/A
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Part 7, Chapter 1, Section 1	1 August 2017	N/A
Part 7, Chapter 2, Section 4	1 August 2017	N/A
Part 7, Chapter 4, Sections 2, 3, 5 & 6	1 August 2017	N/A
Part 7, Chapter 7, Section 3	1 August 2017	N/A
Part 9, Chapter 1, Section 1	1 August 2017	N/A
Part 17, Chapter 2, Section 1	1 August 2017	N/A

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Part 1, Chapter 2
Classification Regulations

■ *Section 2*
Scope of the Rules

2.2 Definitions

2.2.12 **Low wash catamaran**. A low wash catamaran is a particular type of catamaran that has low wash wake characteristics for a specified operating envelope. These vessels are typically of a displacement or semi-displacement form.

Existing paragraphs 2.2.12 to 2.2.29 have been renumbered 2.2.13 to 2.2.30.

~~2.2.30~~ 2.2.31 **Wave ~~piercer~~ piercing catamaran**. A wave ~~piercer~~ piercing catamaran is a particular type of catamaran ~~with lower hulls of a displacement or semi-displacement form~~ which is designed such that the hulls provide ~~that provide a~~ positive freeboard when at rest in ~~smooth~~ still water but which are expected to become partially submerged when advancing in waves.

Existing paragraphs 2.2.31 to 2.2.33 have been renumbered 2.2.32 to 2.2.34.

■ *Section 3*
Character of classification and class notations

3.2 Character symbols

(Part only shown)

3.2.2 A full list of character symbols for which craft may be eligible is as follows:

(d) **100** This character figure will be assigned to all craft considered suitable for sea-going service except those in Service Group ~~1~~ **G1**, **Zone 1**, **Zone 2** and **Zone 3**, *See Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*.

3.5 Service area restriction notations

3.5.1 All craft classed under the Rules will be assigned a service area restriction notation **G** followed by a number, e.g. **G1**, or **Zone** followed by a number, e.g. **Zone 1**. Craft classed under the Rules for service groups **G1** to **G5** and **Zone 1** to **Zone 3** are not suitable for unrestricted service except as noted in the service area restriction notation, *see Pt 1, Ch 2, 3.5 Service area restriction notation 3.5.5*.

3.5.5 The following inland, coastal and seagoing service area restriction notations describe the service area restriction for which ~~the~~ a craft has been approved and constructed.

(a) **Zone 3** covers craft intended for operation in inland waters where the maximum recorded significant wave height based on long-term significant wave height statistics excluding the highest five per cent of the recorded significant wave heights does not exceed 0,5 m. The geographical limits of the intended service are to be identified by the Builder and agreed with LR. Craft in this group are not considered as ‘seagoing’ and are not eligible for the assignment of the character figure **100**.

(b) **Zone 2** covers craft intended for operation in inland waters and estuaries where the maximum recorded significant wave height based on long-term significant wave height statistics excluding the highest five per cent of the recorded significant wave heights does not exceed 1,0 m. The geographical limits of the intended service are to be identified by the Builder and agreed with LR. Craft in this group are not considered as ‘seagoing’ and are not eligible for the assignment of the character figure **100**.

(c) **Zone 1** covers craft intended for operation in inland waters and estuaries where the maximum recorded significant wave height based on long-term significant wave height statistics excluding the highest five per cent of the recorded significant wave heights does not exceed 1,6 m. The geographical limits of the intended service are to be identified by the Builder and agreed with LR. Craft in this group are not considered as ‘seagoing’ and are not eligible for the assignment of the character figure **100**.

~~(a)~~(d) **G1 Service Group 1** covers craft intended for service in sheltered waters adjacent to sandbanks, estuaries, reefs, breakwaters or other coastal features and in similarly sheltered waters between islands in reasonable weather where the range to refuge is, in general, five nautical miles or less. The geographical limits of the intended service are to be identified by the Builder and agreed with LR. Craft in this group are not eligible for the assignment of the character figure **100**.

~~(b)~~(e) **G2 Service Group 2** covers craft intended for service in reasonable weather, in waters where the range to refuge is 20 nautical miles or less. This group will usually cover craft intended for service in coastal waters, for which geographical limits are to be identified by the Builder and agreed with LR.

~~(c)~~(f) **G2A Service Group 2A** covers craft intended for service in reasonable weather in waters where the range to refuge is 60 nautical miles or less. The geographical limits of the intended service are to be reported to LR. Craft in this group are eligible for assignment of the service type notation **SRY**.

~~(d)~~(g) **G3 Service Group 3** covers craft intended for service in waters where the range to refuge is 150 nautical miles or less. The geographical limits of the intended service are to be reported to LR.

~~(e)~~(h) **G4 Service Group 4** covers craft intended for service in waters where the range to refuge is 250 nautical miles or less. The geographical limits of the intended service are to be reported to LR.

~~(f)~~(i) **G5 Service Group 5** covers craft intended for service in waters where the range to refuge is 350 nautical miles or less. The geographical limits of the intended service are to be reported to LR.

~~(g)~~(j) **G6 Service Group 6** covers yachts and steel patrol craft having unrestricted service.

Non-seagoing craft are craft that are not eligible for the character figure **100**. Seagoing craft are craft eligible for the character figure **100**.

The above zone definitions, i.e. **Zone 1**, **Zone 2** and **Zone 3**, are considered to be consistent with the EC resolution ECE/TRANS/SC.3/172/Rev.1 zone definitions.

3.7 Craft type notations

(Part only shown)

3.7.2 A list of craft type notations for which craft may be eligible is given below:

Catamaran	This notation will be assigned to all catamarans including low wash and wave ~~piercers~~ piercing catamarans.

3.10 Application notes

(Part only shown)

3.10.1 Propelling and essential auxiliary machinery includes machinery, equipment and systems installed for the craft/yacht to be under ~~seagoing~~ conditions as encountered in the defined sea area and that are necessary for the following:

3.12 Descriptive notes

3.12.6 **ESW**. Where a low wash catamaran is capable of demonstrating low wash wake characteristics, an environmentally sensitive wake **ESW** descriptive note may be entered in column 6 of the *Register book*. The descriptive note will be assigned where specified wave wake requirements of a local authority are complied with. The descriptive note is to be appended in brackets with the name of the local authority and/or the specified service route, e.g. **ESW(Port of London Authority)**.

Part 3, Chapter 2
Craft Design

■ *Section 4*
Bulkhead arrangements

4.1 General

4.1.1 The criteria on bulkhead arrangements in this Section apply to seagoing craft. Bulkhead arrangements for non-seagoing craft will be specially considered based on the structural requirements and the requirements of the authority where the craft is registered. In the absence of National Authority requirements the relevant requirements of the *Rules for the Classification of Inland Waterway Vessels, July 2017* are to be complied with.

Existing paragraphs 4.1.1 and 4.1.2 have been renumbered 4.1.2 and 4.1.3.

■ *Section 5*
Fore and aft end arrangements

5.6 Strengthening of bottom forward

5.6.1 Except for craft with ~~**G1** and~~ **G2** service notations, additional strengthening of bottom forward ~~is~~ may be required for seagoing craft with ~~the~~ rule length, L_R, greater than 65 m. Details are to be submitted for consideration.

■ *Section 6*
Machinery space arrangements

6.6 Double and single bottom structure

~~6.6.2 For multi-hull craft and other craft which are to be assigned an **HSC** notation or which are to operate within **Restricted Service Groups G1**, **G2**, **G2A** and **G3**, the extent of the double bottom will be specially considered depending on the number of transverse watertight bulkheads and the requirements of the National Authority concerning stability after damage.~~

Existing paragraphs 6.6.3 to 6.6.11 have been renumbered 6.6.2 to 6.6.10.

■ *Section 8*
Particular requirements for multi-hulls

8.5 Bulkheads

8.5.1 ~~Longitudinal watertight bulkheads are to be arranged within the bridging structures of multi-hull craft to improve prevent cross flooding and the spread of smoke and flames in the event of fire. The number and distribution of bulkheads will be specially considered dependent upon the structural configuration and size of the craft but in no case is the number to be less than:~~
~~• one for catamarans of Rule length, L_R, less than or equal to 24 m;~~
~~• two for catamarans of Rule length, L_R, greater than 24 m; and~~
~~• four for trimarans.~~ The number and arrangement of watertight and non-watertight bulkheads in the bridging structure will be specially considered dependent upon the structural configuration and size of the craft. Attention is drawn to the relevant requirements, e.g. structural fire protection and damaged stability, where these bulkheads are acting to prevent cross-flooding and the spread of smoke or flames.

Part 3, Chapter 4
Closing Arrangements and Outfit

■ *Section 1*
General

1.1 Application

1.1.1 The contents of this Chapter are applicable to mono-hull and multi-hull craft constructed in steel, aluminium alloy or composite materials classed in service groups **G1** to **G6**.

1.1.2 The requirements in this Chapter are not applicable to craft classed in service groups **Zone 1** to **Zone 3**. Closing arrangements and outfit for craft classed in service groups **Zone 1** to **Zone 3** are to comply with the requirements of the National Authority. In the absence of National Authority requirements the relevant requirements of the *Rules for the Classification of Inland Waterway Vessels* are to be complied with.

Existing paragraphs 1.1.2 to 1.1.3 have been renumbered 1.1.3 to 1.1.4.

Part 3, Chapter 5
Anchoring and Mooring Equipment

■ *Section 3*
Service group factors

3.2 Craft in service groups Zone 1 to Zone 3

3.2.1 For craft in service groups **Zone 1** to **Zone 3**, the number and mass of anchors are to comply with *Pt 3, Ch 5, 5.9 Anchors for vessels in service groups Zone 1 to Zone 3*; the strength and length of chain cables are to comply with *Pt 3, Ch 5, 6.9 Anchor chains and cables for vessels in service groups Zone 1 to Zone 3*.

Existing sub-Sections 3.2 to 3.5 have been renumbered 3.3 to 3.6.

■ *Section 5*
Anchors

5.9 Anchors for vessels in service groups Zone 1 to Zone 3

5.9.1 For passenger vessels and vessels not intended for the carriage of goods, the total mass *P*, in kg, of the bow anchor(s) is to be as prescribed by the National Authority for the intended service.

5.9.2 In the absence of specified criteria from the National Authority, the mass of high holding power anchors shall be determined as in *Pt 3, Ch 5, 5.9 Anchors for vessels in service groups Zone 1 to Zone 5.9.3*, and the mass of ordinary stockless bower anchors can be determined as in *Pt 3, Ch 5, 5.9 Anchors for vessels in service groups Zone 1 to Zone 5.9.4*.

5.9.3 Where the required mass for anchors of a design approved for the designation ‘High Holding Power’ (HHP) or ‘Super High Holding Power’ (SHHP) is used, the mass of each such anchor will be specially considered on the basis of the vessel’s characteristics and the characteristics of winds, waves and current in the proposed operation area.

5.9.4 For ordinary stockless bower anchors and in the absence of relevant criteria by the National Authorities, the mass of ordinary stockless bower anchors can be calculated in accordance with the criteria given in the *Rules for the Classification of Inland Waterway Vessels, July 2017, Pt 3, Ch 12, 5 Equipment.*

■ *Section 6*
Anchor cable

6.9 Anchor chains and wire cables for vessels in service groups Zone 1 to Zone 3

6.9.1 The length and size of chains and wire cables are to be as prescribed by the National Authority for the intended service.

6.9.2 In the absence of specified criteria from the National Authority, the length and size of chains and wire cables can be calculated in accordance with the criteria given in the *Rules and Regulations for the Classification of Inland Waterway Vessels, July 2017*, *Pt 3, Ch 12, 5 Equipment*.

Part 5, Chapter 1
General

■ *Section 1*
Rule application

1.1 General

(Part only shown)

1.1.7 The load design criteria given in this Part are dependent on the operating mode of the craft as follows:

- Craft operating in the **non-displacement** mode:
  - Typically this applies to craft with a Taylor Quotient, Γ, greater than 3. Γ is defined in *Pt 5, Ch 2, 2.1 Parameters to be used for the determination of load and design criteria 2.1.17*. However, the following is to be noted:
    - Some craft are not designed to plane, but have Γ greater than 3, e.g. SWATHS ~~and~~ ,fast displacement yachts, wave piercing and low wash catamarans. These craft are considered as only operating in the displacement mode.

■ *Section 2*
Direct calculations

2.1 General

2.1.1 Where the designer intends to submit direct calculations, it is the responsibility of the designer to ensure at an early stage that the proposed method and calculations are acceptable to LR. The case for direct calculations is to be supported by the following:

- goal of the requirement;
- reference(s) to published work supporting the proposed method; and
- acceptance criteria.

Existing paragraph 2.1.1 has been renumbered 2.1.2.

Part 5, Chapter 2
Local Design Loads

■ *Section 4*
Loads on shell envelope

4.4 Hydrodynamic wave pressure

4.4.1 The hydrodynamic wave pressure distribution due to relative motion, P_{w}, around the shell envelope up to the operating waterline, i.e. $z \leq T$ is to be taken as the greater of the following:

P_m kN/m^2
as defined in *Pt 5, Ch 2, 4.4 Hydrodynamic wave pressure 4.4.2*

P_p kN/m^2
as defined in *Pt 5, Ch 2, 4.4 Hydrodynamic wave pressure 4.4.3*~~.~~
but is not to be taken less than 7 kN/m^2 or P_{d}, as defined in *Pt 5, Ch 2, 4.5 Pressure on weather and interior decks, 4.5.1* at height H_{w} above the operating waterline, whichever is the greater.

4.5 Pressure on weather and interior decks

(Part only shown)
4.5.2 The pressure acting on weather and interior decks, P_{wh}, in the displacement mode is to be taken as:

E = 0,0 ~~for sheltered decks~~ for interior decks and superstructure decks aft of the forward quarter

■ *Section 7*
Component design load

7.1 Deckhouses, bulwarks and superstructures

(Part only shown)
7.1.1 The component design pressure, P_{dhp}, for the plating of deckhouses, bulwarks and first tier and above superstructures is given by:

$$P_{\mathrm{dhp}} = C_1 \, P_{\mathrm{d}} \quad \mathrm{kN/m^2}$$

P_{d} is defined in *Pt 5, Ch 2, 4.5 Pressure on weather and interior decks*.
For structures other than windows:

C_1 = 1,25 for deckhouse and superstructure fronts on upper deck within the forward third of L_{R}
= 1,15 for deckhouse and superstructure fronts on upper deck outside the forward third of L_{R} and exposed machinery casings on the upper deck
= 1,0 for deckhouse and superstructure fronts above the lowest tier
= 0,8 for superstructure sides. A value of 0,64 may be used where the sides of the superstructure are stepped in from the sides of the craft by 1,0 m or more
= 0,5 elsewhere
L_{R} = Rule length in metres, *see Pt 5, Ch 2, 2.2 Symbols 2.2.1*

For windows of toughened safety glass the component design pressure, P_{dhp}, is to be calculated taking C_1 as follows:

$$C_1 = W_1 \, W_2 \, W_3$$

~~In no case is the design pressure for windows of toughened safety glass to be taken less than $P_{\mathrm{dhp,min}}$ given by~~:

~~$P_{\mathrm{dhp,min}} = W_1 \, G_{\mathrm{f}} \, S_{\mathrm{f}} \, (10 + 0{,}04 \, L_{\mathrm{WL}})$ kN/m^2~~

For windows positioned on the first tier, C_1 is not to be taken less than that used for the deckhouse plating
P_{d} for windows may be tapered to 0,5P_{d} in accordance with *Pt 5, Ch 2, Table 2.4.1 Combined pressure distribution, P_{s}.*
where

W_1 = 2,0 for the lowest tier of unprotected front
= 1,5 for superstructure fronts above the lowest tier

= 1,0 for superstructure sides. A value of 0,8 may be used where the sides of the superstructure are stepped in from the sides of the craft by 1,0 metre or more

= 0,67 elsewhere

W_2 = 0,67 + 0,33 (x_b/L_{WL}) where $x_b > 0,5L_{WL}$ from AP

= 0,67 elsewhere

W_3 = 1 – (y – F)/y

x_b = distance, in metres, from AP

y = vertical distance, in metres, from the static load waterline at the deepest design draught to the structural element considered

F = (D – T) in metres

~~L_{WL} = waterline length, in metres, *see Pt 5, Ch 2, 2.1 Parameters to be used for the determination of load and design criteria 2.1.19*.~~

L_{WL}, D and T are as defined in *Pt 3, Ch 1, 6.2 Principal particulars*.

Part 5, Chapter 3
Local Design Criteria for Craft Operating in Non-Displacement Mode

Section 2
Nomenclature and design factors

2.2 Design factors

Table 3.2.2 Service area restriction notation factor, G_f

Service area restriction notation	Factor
G1, Zone 3	0,6
G2, Zone 2	0,75
G2A, Zone 1	0,8
G3	0,85
G4	1,0
G5	1,2
G6	1,25

Section 3
Hull envelope design criteria

3.1 Hull structures

(Part only shown)

Table 3.3.1 Design pressures for non-displacement craft

Category/location	Craft type	Symbol	Plating pressure	Min.	Symbol	Stiffener pressure	Min
Components							
Deckhouses bulwarks and superstructure		P_{DHP}	$H_f\,S_f\,G_f\,C_f\,P_{dhp}$		P_{DHF}	$\delta_f\,H_f\,S_f\,G_f\,C_f\,P_{dhp} + P_h$	
Deckhouse windows of toughened safety glass		P_{DHP}	$H_f\,S_f\,G_f\,C_f\,P_{dhp}$				
			For windows on first tier and deckhouse fronts	7			
			All other windows	5			

Part 5, Chapter 4
Local Design Criteria for Craft Operating in Displacement Mode

■ *Section 2*
Nomenclature and design factors

2.2 Design factors

Table 4.2.1 Service area restriction notation factor, G_f

Service area restriction notation	Factor
G1, Zone 3	0,6
G2, Zone 2	0,75
G2A, Zone 1	0,8
G3	0,85
G4	1,0
G5	1,2
G6	1,25

■ *Section 3*
Hull envelope design criteria

3.1 Hull structures

(Part only shown)

Table 4.3.1 Design pressures for displacement craft

Category/location	Craft type	Symbol	Plating pressure	Min.	Symbol	Stiffener pressure	Min
Components							
Deckhouses bulwarks and superstructure		P_{DHP}	$H_f S_f G_f P_{dhp}$		P_{DHF}	$\delta_f H_f S_f G_f P_{dhp}$	
Deckhouse windows of toughened safety glass		P_{DHP}	$H_f S_f G_f P_{dhp}$				
			For windows on first tier and deckhouse fronts	7			
			All other windows	5			

Part 5, Chapter 5
Global Load and Design Criteria

■ *Section 2*
Hull girder load criteria for mono-hull craft

2.2 Vertical wave bending moments

(Part only shown)

2.2.1 For all craft except patrol craft in Service Group G6, the minimum value of vertical wave bending moment, M_W at any position along the craft is to be taken as follows:

G_f = Service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 0,5 for G1 craft and Zone 3 craft
= 0,6 for G2 craft and Zone 2 craft
= 0,65 for G2A craft and Zone 1 craft
= 0,7 for G3 craft
= 0,8 for G4 craft
= 1,0 for G5 and G6 craft (yachts only)

■ *Section 3*
Hull girder load criteria for multi-hull craft

3.2 Vertical wave bending moments and associated shear forces

(Part only shown)

3.2.1 The vertical wave bending moments, M_{MW}, including wave and still water effects, at amidship is given by the following:

G_f = Service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 0,5 for G1 craft and Zone 3 craft
= 0,6 for G2 craft and Zone 2 craft
= 0,65 for G2A craft and Zone 1 craft
= 0,7 for G3 craft
= 0,8 for G4 craft
= 1,0 for G5 and G6 craft

■ *Section 4*
Primary load criteria for multi-hull craft

4.2 Global loads for multi-hull craft with partially submerged hulls

(Part only shown)

4.2.1 The twin hull transverse bending moment, M_B, about a longitudinal axis is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 1,25 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 1,35 for G2A craft and Zone 1 craft
= 1,50 for G3 craft
= 2,00 for G4 craft
= 2,50 for G5 and G6 craft

(Part only shown)

4.2.2 The twin hull torsional connecting moment, M_T, is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 0,63 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 0,70 for G2A craft and Zone 1 craft
= 0,75 for G3 craft
= 1,00 for G4 craft
= 1,25 for G5 and G6 craft

(Part only shown)

4.2.3 The vertical shear force, Q_T, at the centreline of the cross-deck structure between the twin hulls is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 1,25 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 1,35 for G2A craft and Zone 1 craft
= 1,50 for G3 craft
= 2,00 for G4 craft
= 2,50 for G5 and G6 craft

4.3 Global loads for multi-hull craft with fully submerged hulls

(*Part only shown*)

4.3.1 The design side force acting at mid-draught of the hull is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 8,5 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 9,4 for G2A craft and Zone 1 craft
= 10,2 for G3 craft
= 13,6 for G4 craft
= 17,0 for G5 and G6 craft

(*Part only shown*)

4.3.4 The twin hull torsional connecting moment, M_T, is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 0,63 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 0,70 for G2A craft and Zone 1 craft
= 0,75 for G3 craft
= 1,00 for G4 craft
= 1,25 for G5 and G6 craft

(*Part only shown*)

4.3.5 The vertical shear force, Q_T, at the centreline of the cross-deck structure between the twin hulls is given by:

G_f = service group factor, *see Pt 1, Ch 2, 3.5 Service area restriction notations 3.5.5*
= 1,25 for G1 and G2 craft and Zone 2 and Zone 3 craft
= 1,35 for G2A craft and Zone 1 craft
= 1,50 for G3 craft
= 2,00 for G4 craft
= 2,50 for G5 and G6 craft

Part 6, Chapter 2
Construction Procedures

■ *Section 4*
Joints and connections

4.5 Fillet welds

(Part only shown)

Table 2.4.1 Weld factors

Item	Weld factor	Remarks
(2) Bottom construction: Non-tight boundaries of floors, girders and brackets	0,21	In way of 0,~~2~~1 x span at ends

4.7 Double continuous fillet welding

(Part only shown)

4.7.4 Double continuous fillet welding is to be adopted in the following locations and may be used elsewhere if desired:

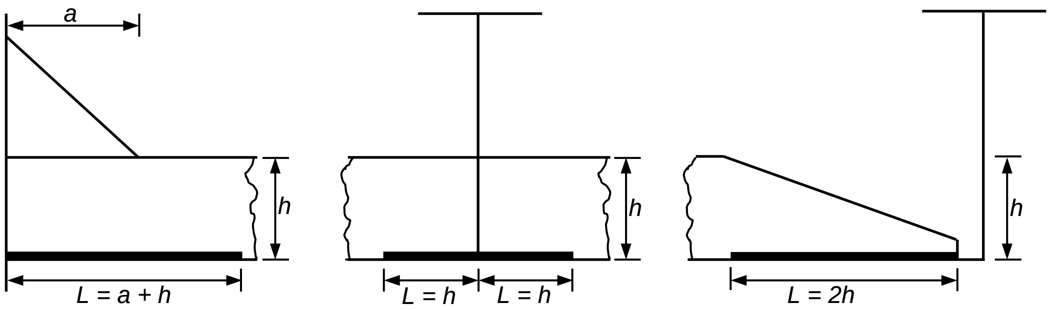
(b) Boundaries of tanks ~~and~~, watertight compartments and gastight compartments or in spaces or locations where condensation, spray or leakage can accumulate.

(l) Locations where double continuous welding is required to qualify assumptions used in structural calculations, e.g. weld of girder flange in way of large cutout in the web.

4.7.6 Where intermittent welding is permitted, the length of double continuous fillet welding required in way of primary and secondary member end connections to plating is as shown in *Figure 2.4.3 Extent of double continuous welding at end connections of primary and secondary members,* and is not to be less than the greater of the following:

- the web depth of the smaller stiffening member extending either side of a stiffener crossing (weld length is required on both sides of the crossing members);
- twice the height of the stiffening member extending from either end of the stiffener if the stiffener is sniped;
- the height of the stiffening member plus the leg length of the attached bracket if the stiffener is bracketed; or
- 0,1 x stiffener span.

4.7.7 Proposals to reduce the double continuous weld lengths for secondary members may be specially considered provided that supporting documentation is submitted which considers effects such as strength, stiffness and dynamic loading frequency and other fatigue aspects.



h = secondary member depth
a = bracket arm length
L = required depth of double continuous weld. In no case is *L* to be less than 0,1 x stiffener span

Figure 2.4.3 Extent of double continuous welding at end connections of primary and secondary members

Existing Figure 2.4.3 has been renumbered Figure 2.4.4.

4.8 Intermittent fillet welding (staggered/chain)

4.8.1 Staggered or chain intermittent welding may be used, outside of the impact area in the side and bottom shell or the underside of the crossdeck structure of high speed craft. Supporting evidence is to be provided and agreed by LR demonstrating that no intermittent welding is applied in the impact areas of high speed craft, *see* Lloyd’s Register Guidance Note – *Extent of double continuous welding for special service craft*. Consideration should be given to the relevant service area notation, service type notation and craft type notation.

4.10 Connections of primary structure

4.10.3 Where direct calculation procedures have been adopted, the weld factors for the 0,~~2~~1 x overall length at the ends of the members will be considered in relation to the calculated loads.

Part 7, Chapter 1
General

■ *Section 1*
Application

1.3 Equivalents

1.3.2 Where the designer intends to submit an equivalent arrangement, it is the responsibility of the designer to ensure at an early stage that the proposed method and calculations are acceptable to LR. The case for the equivalent arrangement is to be supported by the following:

- goal of the requirement;
- reference(s) to published work supporting the proposed method; and
- acceptance criteria.

Part 7, Chapter 2
Construction Procedures

■ *Section 4*
Joints and connections

4.5 Fillet welds

(Part only shown)

Table 2.4.3 Weld factors

	Item	Weld factor	Remarks
(2)	Bottom construction		
	(b) Non-tight boundaries of:		
	• floors, girders and	0,21	in way of 0,~~2~~1 x span at ends

4.8 Double continuous fillet welding

(Part only shown)

4.8.4 Double continuous fillet welding is to be adopted in the following locations and may be used elsewhere if desired:

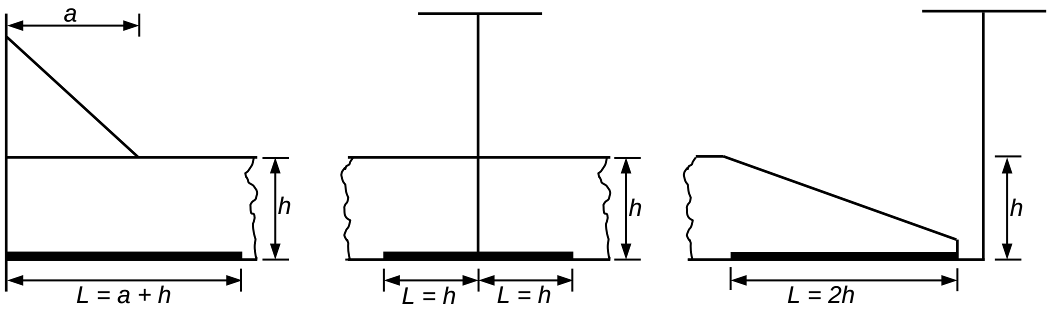
(b) Boundaries of tanks ~~and~~, watertight compartments and gastight compartments or in spaces or locations where condensation, spray or leakage can accumulate.

(l) Locations where double continuous welding is required to qualify assumptions used in structural calculations, e.g. weld of girder flange in way of large cutout in the web.

4.8.6 Where intermittent welding is permitted, the length of double continuous fillet welding required in way of primary and secondary member end connections to plating is as shown in *Figure 2.4.3 Extent of double continuous welding at end connections of primary and secondary members* and is not to be less than the greater of the following:

- the web depth of the smaller stiffening member extending either side of a stiffener crossing (weld length is required on both sides of the crossing members);
- twice the height of the stiffening member extending from either end of the stiffener if the stiffener is sniped;
- the height of the stiffening member plus the leg length of the attached bracket if the stiffener is bracketed; or
- 0,1 x stiffener span.

4.8.7 Proposals to reduce the double continuous weld lengths for secondary members may be specially considered provided that supporting documentation is submitted which considers effects such as strength, stiffness and dynamic loading frequency and other fatigue aspects.



h = secondary member depth
a = bracket arm length
L = required depth of double continuous weld. In no case is *L* to be less than 0,1 x stiffener span

Figure 2.4.3 Extent of double continuous welding at end connections of primary and secondary members

Figure 2.4.3 has been renumbered Figure 2.4.4.

4.9 Intermittent fillet welding (staggered/chain)

4.9.1 Staggered or chain intermittent welding may be used, outside of the impact area in the side and bottom shell or the underside of the crossdeck structure of high speed craft. Supporting evidence is to be provided and agreed by LR demonstrating that no intermittent welding is applied in the impact areas of high speed craft, *see* Lloyd's Register Guidance Note – *Extent of double continuous welding for special service craft*. Consideration should be given to the relevant service area notation, service type notation and craft type notation.

4.10 Connections of primary structure

4.10.3 Where direct calculation procedures have been adopted, the weld factors for the 0,~~2~~1 x overall length at the ends of the members will be considered in relation to the calculated loads.

Part 7, Chapter 4
Scantling Determination for Multi-Hull Craft

■ *Section 2*
Minimum thickness requirements

2.1 General

2.1.2 The thickness of plating and stiffeners determined from the Rule requirements is ~~in no case~~ not to be less than the appropriate minimum requirement given in *Table 4.2.1 Minimum thickness requirements* for craft type.

(Part only shown)

Table 4.2.1 Minimum thickness requirements

Item	Minimum thickness (mm)
	Catamaran
Shell envelope	
Bottom shell plating	$\varphi_s\ \omega\sqrt{k_m}(0,7\sqrt{L_R}+1,0)\geq 4,0\omega$
Side shell plating	$\varphi_s\ \omega\sqrt{k_m}(0,5\sqrt{L_R}+1,4)\geq 3,5\omega$
Wet-deck plating	$\omega\sqrt{k_m}(0,5\sqrt{L_R}+1,4)\geq 3,5\omega$
Single bottom structure	
Centre girder web	~~$\omega\sqrt{k_m}(1,1\sqrt{L_R}+1,4)\geq 5,0\omega$~~ $\varphi_p\omega\sqrt{k_m}(0,8\sqrt{L_R}+1,4)\geq 5,0\omega$
Floor webs	$\omega\sqrt{k_m}(0,8\sqrt{L_R}+1,1)\geq 4,0\omega$ $\varphi_p\omega\sqrt{k_m}(0,6\sqrt{L_R}+1,3)\geq 4,0\omega$
Side girder webs	~~$\omega\sqrt{k_m}(0,8\sqrt{L_R}+1,1)\geq 4,0\omega$~~ $\varphi_p\omega\sqrt{k_m}(0,6\sqrt{L_R}+1,3)\geq 4,0$
Deck plating and stiffeners	
Strength/Main deck plating	$\varphi_s\ \omega\sqrt{k_m}(0,5\sqrt{L_R}+1,4)\geq 3,5\omega$
Lower deck/Inside deckhouse, *see* Note 1	$\varphi_s\ \omega\sqrt{k_m}(0,3\sqrt{L_R}+1,3)\geq 3,0\omega$
Superstructures and deckhouses, *see* Note 1	
Superstructure side plating	$\varphi_s\ \omega\sqrt{k_m}(0,4\sqrt{L_R}+1,1)\geq 3,0\omega$
Deckhouse front 1st tier	$\varphi_s\ \omega\sqrt{k_m}(0,62\sqrt{L_R}+1,8)\geq 3,5\omega$
Deckhouse front upper tier	$\varphi_s\ \omega\sqrt{k_m}(0,55\sqrt{L_R}+1,5)\geq 3,0\omega$
Deckhouse aft	$\omega\sqrt{k_m}(0,25\sqrt{L_R}+0,7)\geq 2,5\omega$
Symbols	
L_R = as defined in *Pt 7, Ch 4, 1.5 Symbols and definitions 1.5.1* $\varphi_p = \frac{0,5\ s}{(105+L_R)}$ but is not to be taken greater than 1 and not less than 0,5 $\varphi_s = \frac{0,6\ s}{(105+L_R)}$ but is not to be taken greater than 1 and not less than 0,5 *s* = stiffener spacing, in mm	
Note 1. Lower thickness may be acceptable depending on the location, loading and provision of protective sheathing as appropriate.	

■ *Section 3*
Shell envelope plating

3.2 Keel plates

Existing paragraphs 3.2.1 to 3.2.4 have been deleted.

3.2.1 The thickness of keel plating is not to be less than the adjacent bottom shell plating and is to be sufficient to withstand the forces imposed by dry-docking the craft.

■ *Section 5*
Single bottom structure and appendages

5.1 General

5.1.3 Where alternatives to the requirements of *Pt 7, Ch 4, 5.1 General 5.1.1* and *Pt 7, Ch 4, 5.1 General 5.1.2* are proposed, they will be specially considered, provided that calculations are submitted to demonstrate that the proposed alternatives have adequate strength, rigidity and stability to resist all anticipated design loadings.

5.2 Keel

Existing paragraphs 5.2.1 to 5.2.2 have been deleted.

5.2.1 The scantlings and arrangements of plate keels are to be in accordance with *Pt 7, Ch 4, 3.2 Keel plates.*

5.2.2 Where a bar keel is fitted, the scantlings are to be sufficient to withstand the forces imposed by dry-docking the craft.

5.3 Centre girder

Existing paragraphs 5.3.1 to 5.3.10 have been deleted.

5.3.1 Centreline girders are generally to be fitted throughout the length of each hull for dry-docking or where the breadth of floors at the upper edge is greater than 1,5 m. They are generally to be fitted in association with transverse frames or transverse web frames supporting longitudinals.

5.3.2 Centreline girders may be formed with intercostal or continuous plate webs. In all cases the face flat is to be continuous. Where girder webs are intercostal, additional bracketing and local reinforcement are to be provided to maintain the continuity of structural strength.

5.3.3 The geometric section properties of the girder webs are to be in accordance with *Pt 7, Ch 3, 1.18 Geometric properties and proportions of stiffener sections*.

5.3.4 The face flat thickness is to be not less than the thickness of the web. The ratio of the width to thickness of the face flat is to be not less than eight but is not to exceed 16.

5.3.5 Centreline girders are to comply with the requirements of *Pt 7, Ch 4, 4.8 Bottom inboard longitudinal primary stiffeners*. The girder is to have adequate resistance to buckling and in some cases web stiffeners may be required.

5.4 Side girders

Existing paragraphs 5.4.1 to 5.4.6 have been deleted.

5.4.1 Where the floor breadth at the upper edge exceeds 4,0 m, side girders are to be fitted at each side of the centreline girder such that the spacing between the side and centreline girders or between the side girders themselves is not greater than 2 m. Side girders where fitted are to extend as far forward and aft as practicable and are, in general, to be scarfed into the bottom structure forward and aft of the support at which they terminate, i.e. terminate in way of bulkheads, deep floors or other primary transverse structure.

5.4.2 The geometric section properties of the girders are to be in accordance with *Pt 7, Ch 3, 1.18 Geometric properties and proportions of stiffener sections*. The girder webs and face flats are to have adequate resistance to buckling.

5.4.3 The face flat thickness is to be not less than the thickness of the web. The ratio of the width to thickness of the face flat is to be not less than eight but is not to exceed 16.

5.4.4 Side girders are to comply with the requirements of *Pt 7, Ch 4, 4.8 Bottom inboard longitudinal primary stiffeners*. The girders are to have adequate resistance to buckling and web stiffeners may be required.

5.4.5 Watertight side girders, and side girders forming the boundaries of tank spaces, are to comply with the requirements for watertight bulkheads and deeptanks as detailed in *Pt 7, Ch 3, 7.2 Watertight bulkhead plating* and *Pt 7, Ch 3, 7.4 Deep tank plating* respectively.

5.4.6 In the engine room, additional side girders are generally to be fitted in way of main machinery seatings. Where fitted, they are to be integrated into the structure of the craft and extended forward and aft as far as practicable.

5.5 Floors general

Existing paragraphs 5.5.1 to 5.5.12 have been deleted.

5.5.1 In transversely framed craft, floors are generally to be fitted at every frame and underneath each bulkhead.

5.5.2 In longitudinally framed craft, floors are, in general, to be fitted at every transverse web frame and bulkhead, and generally at a spacing not exceeding 2 m. Additional transverse floors or webs are to be fitted at half web frame spacing in way of engine seatings and thrust bearings, pillars, skegs, ballast/bilge keels and the bottom of the craft in the forefoot region.

5.5.3 The overall depth of floors at the centreline is not to be taken as less than:
$d_{\mathrm{f}} = 6{,}2L_{\mathrm{R}} + 50$ mm
Where L_{R} is defined in *Pt 7, Ch 4, 1.5 Symbols and definitions 1.5.1.*

5.5.4 The geometric section properties of the girders are to be in accordance with *Pt 7, Ch 3, 1.18 Geometric properties and proportions of stiffener sections*. The girder webs and face flats are to have adequate resistance to buckling.

5.5.5 The face flat thickness is to be not less than the thickness of the web. The ratio of the width to thickness of the face flat is to be not less than eight but is not to exceed 16.

5.5.6 Bottom inboard transverse web frames are to comply with the requirements of *Pt 7, Ch 4, 4.11 Bottom inboard transverse web frames*. The floors are to have adequate resistance to buckling and web stiffeners may be required.

5.5.7 Floors are in general to be continuous from side to side and the tops of floors are, in general, to be level from side to side. For craft having considerable rise of floor the depth of the floor plate may require to be increased to maintain the required section modulus.

5.5.8 The floors are to provide efficient support to the stern tube(s) where applicable.

5.5.9 Watertight floors, or floors forming boundaries of tank spaces, are also to comply with the requirements for watertight bulkheads or deeptanks as detailed in *Pt 7, Ch 3, 7.2 Watertight bulkhead plating* and *Pt 7, Ch 3, 7.4 Deep tank plating* respectively.

5.6 Floors in machinery space

5.6.1 ~~The web thickness, t_{w}, of floors in machinery spaces is to be 1 mm greater than that required by *Pt 7, Ch 4, 5.5 Floors general 5.5.4*.~~ Floors of increased thickness may be required in way of machinery spaces.

5.6.2 The depth and mechanical strength properties of floors between engine or gearbox girders is to be not less than that required to maintain continuity of structural integrity ~~or 50 per cent of the depth given in *Pt 7, Ch 4, 5.5 Floors general 5.5.3*~~. The face flat area and web thickness of such reduced height floors are to be increased appropriately in order to maintain the continuity of structural strength, *see also Pt 7, Ch 3, 4.12 Grouped frames*.

■ *Section 6*
Double bottom structure

6.1 General

6.1.3 Where alternatives to the requirements of *Pt 7, Ch 4, 6.1 General 6.1.1* and *Pt 7, Ch 4, 6.1 General 6.1.2* are proposed, they may be specially considered provided that calculations are submitted to demonstrate that the proposed alternatives have adequate strength, rigidity and stability to resist all anticipated design loadings.

Part 7, Chapter 7
Failure Modes Control

■ *Section 3*
Stress control

3.1 General

(Part only shown)

Table 7.3.1 Limiting stress coefficients for local loading

Helicopter/flight decks:				
(a) Normal usage:	• plating	0,65	-	-
	• secondary stiffening	0,75	0,75	-
	• primary stiffening	0,625	0,625	0,6
(b) Emergency landing:	• plating	0,75	-	-
	• secondary stiffening	1,0	1,0	-
	• primary stiffening	0,825	0,825	0,9
(c) Crane pedestal/foundation structural elements		0,7	0,7	0,75
Definitions				
The slamming zone is the region where the operational non-displacement mode pressures exceed the operational displacement mode pressures, *see Pt 7, Ch 7, 1.3 Symbols and definitions 1.3.2*.				

Part 9, Chapter 1
General Requirements for Machinery

■ *Section 1*
General requirements

1.1 Application

1.1.1 ~~Parts 9 to 16~~ *Pt 9 General Requirements for Machinery* to *Pt 16 Control and Electrical Engineering* apply to the design, construction, installation and testing of:

- Main propulsion machinery systems.
- Essential auxiliary machinery systems, excluding the crankshaft for diesel engines intended for essential services where power does not exceed 110 kW.
- Steering and manoeuvring systems.

together with their associated equipment, pressure plant, piping systems, control engineering and electrical engineering systems for seagoing craft of the ~~craft~~ types stated in *Pt 1, Ch 2, 1 Conditions for classification*.

1.1.2 Machinery for non-seagoing craft is to comply with the requirements of *Part 5 Main and Auxiliary Machinery* of the *Rules and Regulations for the Classification of Inland Waterway Vessels, July 2017.*

Existing paragraphs 1.1.2 to 1.1.5 have been renumbered 1.1.3 to 1.1.6.

Part 17, Chapter 2
Fire Protection, Detection and Extinction – Service Craft

■ *Section 1*
General requirements

1.1 Application

1.1.1 The requirements of this Chapter apply to ~~service~~ craft built in accordance with these Rules for service groups **G1** to **G6**. For craft classed to service groups **Zone 1**, **Zone 2** or **Zone 3**, the criteria of the *Part 6, Chapter 3 Fire Protection, Detection and Extinction* of the *Rules and Regulations for the Classification of Inland Waterway Vessels, July 2017* are to be applied.

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